National Institute of Environmental Health Sciences

The environmental cost of reducing agricultural fine particulate matter emissions

Author(s): Funk PA
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Abstract:

The U.S. Environmental Protection Agency (EPA) revised the National Ambient Air Quality Standards (NAAQS) in 2006, reducing acceptable fine particulate matter (PM2.5) levels; state environmental protection agencies in states with nonattainment areas are required to draft State Implementation Plans (SIPs) detailing measures to reduce regional PM2.5 levels by reducing PM2.5 and PM2.5 precursor emissions. These plans need to account for increases in emissions caused by operating control technologies. Potential PM2.5 emissions reductions realized by adding a second set of dust cyclones were estimated for the cotton ginning industry. Increases in energy consumption were calculated based on dust cyclone air pressure drop. Additional energy required was translated into increased emissions using published emission factors and state emissions inventories. Reductions in gin emissions were compared with increases in emissions at the power plant. Because of the electrical energy required, reducing one unit of agricultural PM2.5 emissions at a cotton gin results in emitting 0.11-2.67 units of direct PM2.5, 1.39-69.1 units of PM2.5 precursors, 1.70-76.8 units of criteria pollutants, and 692-15,400 units of greenhouse gases at the point where electricity is produced. If regulations designed to reduce rural PM2.5 emissions increase electrical power consumption, the unintended net effect may be more emissions, increased environmental damage, and a greater risk to public health. Copyright 2010 Air & Waste Management Association.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event, Food/Water Security, Unspecified Exposure

Air Pollution: Particulate Matter

Extreme Weather Event: Other Extreme Event

Extreme Weather Event (other): dust cyclones

Food/Water Security: Agricultural Productivity

Geographic Feature:

resource focuses on specific type of geography

Rural

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Workers

Other Vulnerable Population: farmers

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Short-Term (

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content